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EXAMINER

HUFFMAN, JULIAN D

ART UNIT

PAPER NUMBER

2853

DATE MAILED: 06/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No. 09/782,029

Applicant(s)

MOON ET AL.

Examiner

Julian D. Huffman

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 10 April 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 2,3,6, 9,23-25,27, 36 and 37 is/are pending in the application.
- 4a) Of the above claim(s) 23-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2,3,6,9 and 27 is/are rejected.
- 7) ☒ Claim(s) 36 and 37 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 February 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Claims 23-25 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim.

### ***Claim Objections***

2. Claims 2, 3, 6 and 9 are objected to because of the following informalities:

In claim 2, the limitation of the nozzle plate directly coupled to the front surface of the substrate is objected to since applicant's invention shows a layer of adhesive interposed between the nozzle plate and the substrate. U.S. 6,190,492 B1 to Byrne et al. disclose a "direct nozzle plate to chip attachment" (title) in which "separate adhesive is avoided in the manufacture of a thermal ink jet printhead by positioning a thermoplastic nozzle plate on a semiconductor circuit chip" (abstract). As supported by the Byrne et al. reference, the language used in the claims of the present application is contrary to what is described in applicant's disclosure.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2, 6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsutomu (JP 404161340 A) in view of Bassous et al. (U.S. 3,949,410).

Tsutomu discloses an ink-jet printhead comprising:

a substrate being a single integrated monolithic unit (2), said substrate, having a rear surface, said rear surface having a channel (7) having a predetermined depth, wherein a plurality of ink feed holes are formed on a bottom of the channel perforating said substrate (element 7, a plurality of nozzles are formed on the head, as seen in fig. 7, and a channel is provided for each nozzle);

a nozzle plate coupled to a front surface of the substrate (3), said nozzle plate being perforated by a plurality of chamber-orifice complex holes (8), wherein each chamber-orifice complex hole corresponds to at least one of said plurality of ink feed holes (fig. 1);

a plurality of heaters disposed on the front surface of the substrate (10), each one of said plurality of heaters being located near corresponding ones of said plurality of chamber-orifice complex holes (fig. 1), wherein each one of said plurality of ink feed holes is formed at a center portion of a corresponding one of said plurality of chamber-orifice complex holes (fig. 1), and each one of said plurality of said heaters surrounds corresponding ones of said plurality of ink feed holes (abstract);

wherein each chamber-orifice has a truncated conical shape, wherein a lower end of said chamber orifice facing said substrate faces the corresponding ink feed hole

and heater formed on the substrate and the other end having a smaller diameter faces toward an outside of said ink-jet printhead (fig. 1).

wherein said substrate comprises two channels in parallel with each other (element 7, a plurality of nozzles are formed on the head, as seen in fig. 7, and a channel is provided for each nozzle);

Tsutomu does not expressly disclose the substrate being made of silicon.

However, Bassous et al. disclose the use of a silicon substrate (abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the substrate of Tsutomu of silicon, as taught by Bassous et al. The reason for performing the modification would have been to enable the use of fabrication technology compatible with present day integrated circuit processing procedures utilizing semiconducting silicon (column 2, lines 46-48), allowing control circuitry to be integrated on the same substrate (column 12, lines 61-65) and enabling the individual jets to be addressed separately and controlled separately (column 13, lines 10-13).

**5.** Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsutomu and Bassous et al. as applied above and further in view of Abe et al.

Tsutomu as modified discloses everything claimed with the exception of the heater being omega in shape.

Abe et al. disclose an omega shaped heater (fig. 17c).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to replace the heater of Tsutomu with the heater of Abe et al. The reason for performing the modification would have been to improve the lifetime of the head by reducing cavitation damage to the heating element (Abe et al., column 14, lines 20-40).

6. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murthy et al. (U.S. 6,045,214) in view of Bassous et al.

Murthy et al. disclose an ink-jet printhead, comprising:

a substrate being a single integrated monolithic and homogenous unit (fig. 1, element 12), said substrate, having a rear surface, said rear surface having a channel (28) having a predetermined depth, wherein a plurality of ink feed holes are formed on a bottom of the channel perforating said substrate (there are a plurality of nozzle arrangements with an ink feed channel for each pair);

a nozzle plate coupled to a front surface of the substrate (10), said nozzle plate being perforated by a plurality of chamber-orifice complex holes (18), wherein each chamber-orifice complex hole corresponds to at least one of said plurality of ink feed holes; and

a plurality of heaters disposed on the front surface of the substrate (22, column 2, lines 32-36), each one of said plurality of heaters being located near corresponding ones of said plurality of chamber-orifice complex holes, said nozzle plate being a single integrated monolithic and homogenous unit, each chamber-orifice hole having a

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cylindrical shaped portion on a portion of said chamber-orifice hole closest to a side of said nozzle plate that attaches to said substrate and a conical shaped portion on a portion of said chamber-orifice hole closest to a side of said nozzle plate opposite from where said nozzle plate attaches to said front surface of said substrate, said conical shaped portion being a section of a right circular cone with an axis perpendicular to said front surface of said substrate and perpendicular to said surfaces of said nozzle plate (fig. 1).

The method of manufacturing the printhead does not further limit the apparatus.

Murthy et al. do not expressly disclose the substrate being made of silicon.

However, Bassous et al. disclose the use of a silicon substrate (abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the substrate of Murthy et al. of silicon, as taught by Bassous et al. The reason for performing the modification would have been to enable the use of fabrication technology compatible with present day integrated circuit processing procedures utilizing semiconducting silicon (column 2, lines 46-48), allowing control circuitry to be integrated on the same substrate (column 12, lines 61-65) and enabling the individual jets to be addressed separately and controlled separately (column 13, lines 10-13).

***Allowabl Subj ct Matter***

7. Claims 36 and 37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record does not disclose a heater surrounding the ink feed hole and a orifice hole having a cylindrical shaped portion and a conical shaped portion.

***Response to Arguments***

8. Applicant's argument that Tsutomo does not disclose direct attachment of the nozzle plate to the substrate has been considered. As discussed in the objection to claim 2, outlined above, applicant's invention does not disclose direct contact of the nozzle plate to the substrate. In applicant's invention, an intervening structure 40 is interposed between the nozzle plate and the substrate. Tsutomu discloses a nozzle plate coupled to a substrate with an intervening structure 4 and is believed to be equivalent to applicant's claimed structure.

Applicant's argument that Tsutomo does not disclose the parallel channels has been considered and is respectfully not found persuasive. There is more than one nozzle in the ink jet head taught by Tsutomo. Fig. 7 shows plural nozzle arrangements in parallel each with its own feed hole. Fig. 7 represents a different embodiment from figs. 1 and 4 in that a side feed ink channel is disclosed in fig. 7, while a bottom or center feed ink channel is shown in figs. 1 and 4. Regardless, fig. 7 shows the plural



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nozzles arranged in parallel and this suggests that similarly, plural nozzle arrangements shown in figs. 1 and 4 are provided and arranged in parallel.

### ***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Julian D. Huffman whose telephone number is (703) 308-6556. The examiner can normally be reached on Monday through Friday from 9:00 a.m. to 5:30 p.m.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Russ Adams, can be reached at (703) 308-2847. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7722. Faxes requiring the immediate attention of the examiner may be sent directly to the examiner at (703) 746-4386. Note that this number will not automatically send a confirmation that the fax was received.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



JH

20 June 2003



JUDY NGUYEN  
PRIMARY EXAMINER